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CHICAGO 16, ILLINOIS

GAS ABSTRACTS

SEPTEMBER, 1954

VOLUME 10 NUMBER 9

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

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GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $18.00 per year to U.S. addresses; $22.00 foreign.—Printed in the U.S.A.

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1. GAS INDUSTRY

Construction Plans

1954 CONSTRUCTION APPROACHES LEVELS OF RECORD YEARS. *Gas*, 30, 105-7, 110-12 (1954) May.

A rundown on the planned construction of new facilities by the major pipeline companies for 1954. Five pages of maps and details are included. B. E. Eakin

1.2 BILLION ALLOCATED FOR CONSTRUCTION BY 210 UTILITIES. *Gas*, 30, 33, 38 (1954) May.

A breakdown of expenditures is tabulated in 5 categories: production, storage, transmission, distribution, and general. Extrapolated to cover the entire field, this gives a sound indication of the gas industry's determination to fulfill its promise to overtake the faltering coal interest's No. 2 spot as America's leading source of energy within five years, and be on the way to catching the present leader, oil.

B. E. Eakin

Northwest Gas

GAS LINE START NEAR. *Oil Gas J.*, 53, 84-85 (1954) June 28.

A discussion of Pacific Northwest Pipeline Corporation's proposed 160 million dollar pipeline from the San Juan basin to Northern Washington reviews the gas source, market and line route. R. F. Bukacek

Phillips Decision

PHILLIPS DECISION CONFUSES INDUSTRY. *Gas Age*, 114, 11-13 (1954) July 1.

The Supreme Court has decided (5 to 3) that the FPC has jurisdiction over the price of wellhead gas that is handled in interstate commerce. The opinion of the court has an almost universal unpopularity in the natural gas industry.

W. G. Bair

Rate Change Problems

THE REGULATORY LAG AND WHAT TO DO ABOUT IT. *Public Utilities Fortn.*, 53, 787-798 (1954) June 24.

This article deals with the question of what to do about the loss of proper earnings claimed by a utility between the time a petition for a rate increase is filed and rate relief, if any, becomes effective. The plan proposed in Alberta Province was to treat this loss due to procedural delay like any other expenditure made by the utility for the benefit of the ratepayer on the theory that if the ratepayers wanted a delay in a rate increase later found to be justified they ought to pay for it. The amount was held subject to amortization out of rates. In comment the commission chairman feels New York solves the situation adequately by giving quick action in obvious cases, and permitting rates to go in under bond when only part of a petition may be justified. The methods employed to meet this situation by Minnesota, Massachuetts, Vermont, Georgia, Connecticut, Missouri and others are reported. A point brought out by several commenters is the lack of proper mechanism to speed up action or provide for rebates to the customer in the case of rate reductions following general price declines.

R. T. Ellington

2. APPLIANCES

Burners

Du Fault, H. D. GAS BURNER SECONDARY AIR FEED AND FLAME BAFFLE. U. S. 2,684,711 (1954) July 27.

Ferrel, G. W. GAS BURNER AND INTERNAL FLOW RESTRICTOR. U. S. 2,679,897 (1954) June 1.

Glickman, S. L. GAS FUELED BURNER. U. S. 2,682,919 (1954) July 6.

Godsey, H. M. VARIABLE ORIFICE GAS BURNER. U. S. 2,678,091 (1954) May 11.

Kennedy, W. (assigned to William D. Kennedy) SHEET METAL GAS BURNER. U. S. 2,682,-304 (1954) June 29.

Controls and Ignition

Cairns, F. E., Jr. (assigned to General Controls Co.) FUEL BURNER SAFETY CONTROL USING FLAME CONDUCTION. U. S. 2,684,-115 (1954) July 20.

Hanson, H. L. (assigned to Minneapolis-Honeywell Regulator Co.) SELF-CHECKING BURNER SAFETY CONTROL APPARATUS. U. S. 2,678,090 (1954) May 11.

Mueller, E. H. FLASH TUBE STRUCTURE FOR GAS LIGHTERS. U. S. 2,682,920 (1954) July 6.

Mueller, E. H. FLASH TUBE LIGHTER STRUCTURE FOR GAS BURNERS. U. S. 2,682,921 (1954) July 6.

Nelson, J. A., Algino, J. M. and Webber, G. F. (assigned to Cribben and Sexton Co.) CONTROL UNIT FOR MAIN GAS BURNERS AND PILOT BURNERS. U. S. 2,682,922 (1954) July 6.

Racek, A. and Raganitsch, J. GAS IGNITER. U. S. 2,679,150 (1954) May 25.

Ray, W. A. (assigned to General Controls Co.) FUEL BURNER SAFETY CONTROL SYSTEM. U. S. 2,678,092 (1954) May 11.

Reinhart, H. C. (assigned to Magic Chef, Inc.) FLASH TUBE SYSTEM FOR GAS BURNERS. U. S. 2,682,303 (1954) June 29.

Refrigeration

Ullstrand, H. M. (assigned to Aktiebolaget Elektrolux, Stockholm) DISTRIBUTION OF REFRIGERANT IN ABSORPTION REFRIGERATION SYSTEM. U. S. 2,682,156 (1954) June 29.

This patent covers improvements in the Platen-Munters type of refrigeration system. A receiver for liquid refrigerant from the condenser and a vessel to store unevaporated refrigerant are provided and connected so as to regulate flow of refrigerant through the evaporator. The regulation is such as to allow increased flow of refrigerant through the evaporator when required because of increased heat load. When heat load is reduced, refrigerant is stored in the receiver. J. F. Reed

Space Heaters

Cartter, W. G. (assigned to Affiliated Gas Equipment, Inc.) FLOOR FURNACE WITH TUBULAR HEATING ELEMENT. U. S. 2,682,867 (1954) July 6.

Glasby, J. P. (assigned to The J. P. Glasby Mfg. Co., Inc.) FORCED AIR FLOW WARM AIR HEATING FURNACE. U. S. 2,684,667 1954) July 27.

Kamm, W. I., Krautter, W. F. and Staiger, K. (assigned to the United States of Am.) STARTING DEVICE FOR SPACE HEATERS OF THE PULSE JET TYPE. U. S. 2,684,712 (1954) July 27.

Water Heater

Carson, H. J. GAS FIRED WATER HEATER. U. S. 2,684,054 (1954) July 20.

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution

Allcutt, E. A. AIR POLLUTION CONTROL IN CANADA. *Can. Chem. Processing*, 38, 44-46, 48, 50, 52, 54, 56 (1954) May.

An analysis of the overall problem and a valuable summary of existing anti-pollution by-laws are presented. Special pollution problems and the work of the International Joint Commission are described. D. J. Dennison

District Steam Plant

HANDLE 120 TONS AN HOUR IN NEW MEDICAL CENTER. *Coal-Heat*, 67, 22-24 (1954) July.

Chicago Medical Center buildings now occupy about one-fourth of the projected area of 462 acres. This great medical facility is heated by a new mechanized steam plant of 3 boilers with a total capacity of 270,000 lb steam per hour, with provision for extensions. Present coal consumption is 16000 tons of Illinois screenings for the winter season, with gas as auxiliary fuel during summer months. O. P. Brysch

Engine Fuel

GAS FOR RUNNING-IN CAR ENGINES. *Gas World* (British), 139, 124, 125 (Suppl.) (1954) June 19.

A company which rebuilds engines now uses gas for this purpose since one therm of gas has been found equivalent to 6.25 pints of gasoline which in England gives gas a 60% cost advantage. Engines are mounted back to back, one driving, the other driven. A harder spark is used and gaps reduced to 0.012-0.015 in. Power curve tests give better results on gas than gasoline. All parts-washers and degreasers in the plant are gas-heated with immersion tubes.

R. T. Ellington

4. CARBONIZATION AND GASIFICATION

Catalytic Reforming

Griggs, E. R. PATERSON PLANT EXPERIENCE WITH C. C. R. Paper No. CEP-54-15, Amer. Gas Assoc., Opertg. Section, Pittsburgh, Pa. (1954) May; *Gas Age*, 114, 45-48, 80, 82, 84 (1954) July 15.

The cyclic catalytic reforming plant of the Public Service Electric and Gas Co., Paterson, N. J. is described, together with operating results obtained feeding natural gas, butane and kerosine.

H. A. Dirksen

Carbonization

Kirby, R. A. THE RAPID CARBONISATION OF COAL. *Brit. Coal Utilis. Res. Assoc., Monthl. Bull.*, 18, 241-259 (1954) June.

The prospects of developing a process to produce a graded marketable fuel from coals of low swelling number, without the need for briquetting, are sufficiently encouraging to warrant active investigation in this field. Since the beneficial effects of rapid carbonisation are largely confined to temperatures up to the softening point of the coal, it may well be possible to use two-stage processes in the manufacture of both metallurgical coke and domestic smokeless fuel. As we have seen, such a process on an experimental scale has already been reported by Jäppelt, in which the rapidly preheated coal was fed into a stationary retort in which the conditions appear to have been ideal for the formation of metallurgical coke. Domestic smokeless fuel, requiring less rigidly defined qualities, is the type of product which it is possible to expect if a continuous process of the Disco type were substituted, as the second stage, for the stationary retort.

Author's Abstract

Coal Structure

Nelson, J. B. X-RAY STUDIES OF THE ULTRA-FINE STRUCTURE OF COAL: I, LOW-ANGLE SCATTERING OF VITRINITE FROM COALS OF DIFFERING RANK. *Fuel* (British) 33, 153-175 (1954) April.

X-ray studies using both normal and small-angle diffraction cameras revealed the presence of an inner maximum presumably due to the grouping of carbon atoms in macromolecular bunches in the coal, and the presence of an outer maximum which is indicative of the graphite structure in the coal. The continuous low-angle scattering is probably due to the difference in the electron densities of the continuous coal substance and the network of submicroscopic pores.

S. Mori

Schuyer, J. and van Krevelen, D. W. CHEMICAL STRUCTURE AND PROPERTIES OF COAL III—MOLAR REFRACTION. *Fuel* (British) 33, 176-183 (1954) April.

From the previously reported work on reflectivities of coal, data on refractive index compared with the sum of the atomic refractions (per atom of carbon) permits the calculation of the molar refractometric increment per aromatic carbon atom. This increment determines a size factor called the "aromatic area" of the condensed aromatic molecule, which can be checked with known compounds. Applied to coal, the total number of carbon atoms per average structural unit (as well as H, O, and N atoms, and number of rings) can be roughly determined for the first four terms of the coalification series (on the reflectivity basis).

O. P. Brysch

Coking of Blends

Bardgett, H. CARBONIZATION OF BLENDS OF COAL TO PRODUCE METALLURGICAL COKE. *J. Inst. Fuel* (British), 27, 274-298, 318 (1954) June.

Experiments by the Fuel Research Board of the D.S.I.R. in 2-ton intermittent vertical retorts 11″ wide show that weakly-caking high-volatile Northumberland coal (Type 700/800) can be blended with Durham coking coal (Type 301), gas-coking coal (401) and gas coal (501) to the extent of up to 60% without seriously affecting the shatter index, and up to 50, 40 and 40% respectively without reducing the Cochrane abrasive index. This would save about 2½ million tons of good coking coal annually. Likewise Durham coal Type 501 can be blended in any proportion with Durham types 301 and 401, to produce high-shatter index cokes. Reduced rates of coking improve the shatter strength appreciably, but "soaking" gave only slight improvement. Low-volatile "cinder" coal, resultant of igneous intrusion, can be blended with Durham Type 401 to the extent of 20% to 25%.

The appended discussion covers correlation of retort and coke oven results, incentive for blending, lost output, earlier test work and criteria of coke quality. O. P. Brysch

Copenhagen Gas Works

Jensen, H. KOBENHAVNS GASVAERKERS AFTAGNING AF REFORMET PYROLYSE-GAS. (COPENHAGEN GAS WORKS WILL UTILIZE REFORMED PYROLYSIS GAS). *Svenska Gasverksfoereningens* (Swedish) **21**, 49, 50, 51-54 (1954) April.

After a description of the actual production of the gasworks in Great-Copenhagen which have a total production of about 200 mill. m^3 town gas a year for a population in the city of about 1,200,000, the author mentions the plans of a main-gasworks in Copenhagen. For the present it is, however, decided that gas corresponding to 35-60 mill m^3/year of town gas of 4.200 kcal/Nm^3 will be taken off from an oil cracking plant (pyrolysevaerk), which is being built in Copenhagen. The oil gas has a higher heat value than 4,200 kcal/Nm^3 and for that reason there is under construction in the neighborhood of the oil cracking plant a transformation plant (reforminganlaeg). In this plant the oil gas is transformed into town gas by adding steam at 700°-1,000° C. over a catalyst.

Author's Abstract

Liquid Purification

Terres, E., Buscher, H. and Matroff, G. ZUR KENNTNIS DER VORGAENGE UND DER REAKTIONSGESCHWINDIGKEITEN BEI DER REGENERATION DER WASCHLAUGEN DER METALITHIONATVERFAHREN ZUR AMMONIAK- UND SCHWEFELWASSERSTOFF-REINIGUNG VON STEINKOHLENGAS UEBER EIN MAGANSULFATVERFAHREN. (ON THE REACTION PATH AND VELOCITY OF REGENERATION OF METAL THIONATE WASH SOLUTION IN PURIFICATION OF COAL GAS FROM AMMONIA AND HYDROGEN SULFIDE BY A MANGANESE SULFATE PROCESS). *Brennstoff-Chemie* (German), 35, 144-151 (1954) May 19.

This is the concluding section of a paper reporting extensive laboratory studies on reactions involved in a process for recovery of NH_3 and H_2S as ammonium sulfate and elemental sulfur.

D. M. Mason

Synthesis Gas

Jewell, J. W. (assigned to The M. W. Kellogg Co.) METHOD FOR MANUFACTURE OF A GAS RICH IN HYDROGEN. U. S. 2,681,272 (1954) June 15.

The production of synthesis gas having a molar ratio of H_2 to CO of 2.0 using a catalyst in a psuedo-liquid state is described. The process is made possible by injection of methane-oxygen mixture at the bottom of the reactor and injection of methane-H2O mixture further up in the reactor bed. S. Mori

Odell, W. W. (assigned to Standard Oil Development Co.) PROCESS FOR MAKING COMBUSTIBLE GAS. U. S. 2,681,273 (1954) June 15.

A process for the manufacture of a combustible gas utilizing a fluidized bed is described. The patent claims the combustion products CO_2 and N_2, obtained mainly from the heating process to carry on the reaction, may be vented in a separate stack-line thereby keeping the product gas in a purer state and with a higher heating value.

S. Mori

T.P.C. Oil Gas

Loughry, T. F. THE PRODUCTION OF HIGH BTU. GAS WITH THE TPC PROCESS. Paper No. CEP-54-19, Amer. Gas Assoc., Operatg. Section, Pittsburgh, Pa. (1954) May.

Results are reported of recent pilot plant runs by the T.P.C. process, which were sponsored by the American Gas Association. PAR program to establish its commercial feasibility. Successful operation on two feedstocks,—a premium reduced crude and a heavily cracked Bunker C, —was achieved for both 1000 and 1300 Btu gas. Corrected material balances show the economics of the process to be at least equal to the Hall process, with perhaps considerably lower gas costs if higher byproduct prices are obtained.

O. P. Brysch

Water Gas Performance

Burns, J. C. W. G. IN NORTH THAMES. *Gas J.* (British), 278, 633-636 (1954) June 9.

Plant performance data on carburetted water gas production were obtained to determine the possible maximum output of 9 ft. I.D. gener-

ators, operating with standard gas oil and water-gas coke. Some comparative data on 7 ft and 11 ft I. D. generators are also included. A portion of these data is given below:

Generator, I.D., ft	9	9	7	11
Machines, number	4	2	1	1
Cycle, min.	2.40	2.40	2.45	2.50
Gas, Btu/SCF	483	504	512	510
Rate, unit, MSCF/D	5,717	5,911	2,491	8,090
Oil, gal/MCF	1.77	2.00	2.14	2.14
Efficiency, %	60.7	58.5	56.5	59.0

Attempts to operate the carburettor with a mixture of 70% gas oil and 30% heavy oil of 8% Conradson carbon content, and without changing the operating cycle, resulted in early plugging of the carburettor checkerbrick. To permit heavy oil operation with the present sets, it would appear necessary to install the oil sprays directly in the generator and to provide burn-off air in the carburettor. Additionally, it is hoped to employ non-caking coal in a modified carburetted water-gas plant now under construction. C. G. von Fredersdorff

King, J. G. CARBURETTED WATER GAS FROM HEAVY FUEL OIL. *Coke and Gas* (British), **16**, 201-204 (1954) May.

Recent developments in the use of heavy fuel oil for the manufacture of carburetted water gas are reviewed and the results so far obtained are employed to forecast future developments. Author's Abstract

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Ammonia Synthesis

Reidel, J. C. MAKING AMMONIA-II. A FIRST: HYDROGEN BY PARTIAL OXIDATION. *Oil Gas J.*, **53**, 86-91 (1954) June 7.

The new Vicksburg works of the Spencer Chemical Co. is the first ammonia plant to employ the partial oxidation method for making hydrogen. The overall process, schematically represented in a flow chart, includes the following five major steps: 1) Synthesis gas preparation by partial oxidation. 2) Shift conversion. 3) Gas purification, which includes liquid nitrogen wash. 4) Addition of more nitrogen from the liquid air plant. 5) Ammonia synthesis. Individual items of special interest are discussed in some detail. Eight photographs are included. S. Hu

Carbon Black

Govier, G. W., Quon, D. and Wanat, W. CARBON BLACK FROM NATURAL GAS. *Can. Chem. Processing*, **28**, 62, 64, 66, 68, 70 (1954) May.

The salient economic and technical features of carbon black manufacture are reported with particular consideration of the utilization of natural gas from Alberta, Canada. The use of channel and furnace processes, and the competition from oil blacks are discussed. Alternate processes are introduced,—Schoch electric arc decomposition of natural gas, and the Pidgeon process now being tested in pilot plant by the Research Council of Alberta. Results indicate that black of furnace thermal quality may be produced at yields of 15 lbs/MSCF of 1000 Btu gas with fuel requirements being satisfied by the off-gas. The Canadian market for blacks is in Ontario and depends upon the rubber industry. Transportation charges for bringing oil and natural gas to market are compared. E. B. Shultz

CO_2 Removal

Benson, H. E., Field, J. H. and Jimeson, R. M. CO_2 ABSORPTION EMPLOYING HOT POTASSIUM CARBONATE SOLUTIONS. *Chem. Eng. Progress*, **50**, 356-64 (1954) July.

A description of work done by the Bureau of Mines on the removal of CO_2 from synthesis gas at pressures from 200 to 300 psi. A comparison of amine and hot carbonate process scrubbing is made and the results of pilot plant studies are presented. R. F. Bukacek

Construction Data

Gas Appliances Mfrs. Assoc., Inc. NATURAL GAS CONSTRUCTION DATA: JANUARY 1954 SUPPLEMENT (1954) June.

This report is a supplement to the cumulative 1945-1953 report of similar title published in June 1953. Based upon Federal Power Commission data, it covers over 95% of the authorized natural gas construction activity to January 1,

1954. It consists of 7 tables (totalling 34 pages) of data, listed by city, gas company, and total and major authorized and pending construction, and also 5 pages of corrections for insertion in the 1953 issue. O. P. Brysch

Distribution Costs

Babbe, G. CUTTING COSTS IN THE DISTRIBUTION DEPARTMENT. *Gas*, 30, 52-56 (1954) June.

The evaluation of the ability of field-foremen to properly train and utilize their personnel is one of the most difficult problems of the supervisors. The establishment of a standard time work-unit for each of the various jobs which the men must perform, and for the conditions under which the job is performed, permits a more realistic evaluation of each foreman's abilities. This, coupled with a cost control program, will supply information on which the most effective use of supervisory and management time and attention can be based. B. E. Eakin

Distribution Safety

Fox, G. M. RELIEF VALVES ON CUSTOMER METER SETS. *Gas*, 30, 57-62, 64, 66, 68 (1954) June.

The problem of protecting against overpressuring on customer meter sets has become increasingly important to the gas industry during the past several years. Three types of relief are discussed: spring loaded relief valves, back pressure regulators, and expansible tubes. The advantages and disadvantages of each are discussed, and the practice of five different utilities is compared. B. E. Eakin

Wolfe, K. R. OVER-RIDE PROTECTION OF DISTRIBUTION SYSTEM PRESSURE. *Gas*, 30, 40-44 (1954) June.

As the gas industry continues its tremendous expansion program it becomes increasingly important that safety keep pace with progress in other phases. Increasing pressures have been introduced into systems designed originally for low pressure distribution, imposing a more rigorous set of operating conditions on equipment, and the possibility of accidental excess pressure. The design and installation of over-ride monitor pressure control systems is presented and the operation of five different types is explained in detail. B. E. Eakin

Dust Removal

Lapple, C. E. ELEMENTS OF DUST AND MIST COLLECTION. *Chem. Eng. Progress*, 50, 283-287 (1954) June.

This article, the first of a series, is devoted to definitions, equipment review, sampling, and data procurement. The general economics of dust and mist removal are discussed.

W. G. Bair

Richardson, H. L. (assigned to Research Corp.) RECOVERY OF SUSPENDED MATERIALS FROM GASES. U. S. 2,681,121 (1954) June 15.

The invention is particularly described with reference to the cleaning of gases from ferro-manganese blast furnaces; it also relates to the recovery of suspended materials from gases for which a method and apparatus for the recovery in dry form of water-soluble materials in suspension in gases is presented. The invention is particularly useful in preventing noxious water-soluble materials suspended in gases from escaping in process waste-water.

S. Volchko

Field Practise

Anderson, K. F., Elliott, W. C., Jr. and Moore, J. L. PETROLEUM-ENGINEERING STUDY OF THE ELLENBURGER RESERVOIR, BIG LAKE FIELD, REAGAN COUNTY, TEX. U. S. Bur. Mines Rept. Invest. 5048 (1954) May.

This report, necessarily limited by the data available, presents an engineering analysis of the first reservoir that produced from the Ellenburger formation in West Texas. Throughout the report, the writers found it necessary to make several estimates, and whenever estimates were used on attempt was made to apply them in such a manner as to minimize their effect on the final answer. It is believed that the experience gained in this field and reported herein can serve as a helpful guide to those faced with the task of planning operational programs and predicting the recovery of petroleum from other similar reservoirs. In addition to the estimates of ultimate recovery, the report contains sample calculations and estimates of theoretical recovery based on different methods of operation. B. E. Eakin

Clay, T. W. PRESSURE MAINTENANCE BY GAS INJECTION . . . IN OPELIKA

FIELD OF HENDERSON COUNTY, TEXAS. *Oil Gas J.*, 53, 74-77 (1954) May 31.

The pressure maintenance by reinjection of the processed gas was initiated in January, 1941. This program has resulted in increased recoveries of both oil and condensate and the field data indicates that ultimate recovery should exceed the recoveries normally assigned to this type of operation. A production and pressure-history graph for the field is included.

B. E. Eakin

Crumley, J. A., Edele, R. H. and Harnish, D. H., Jr. FISHING TOOLS, THEIR APPLICATIONS TO THE OIL AND GAS INDUSTRY OF WEST VIRGINIA. West Virginia Univ. Techn. Bull. No. 35 (1953) February.

The various types of equipment used to recover lost and stuck drill strings are described in detail. The operation and proper application of each tool is presented. B. E. Eakin

Hollis, W. T. DRILLING WELLS WITH GAS AS A CIRCULATING MEDIUM INSTEAD OF MUD. *Gas*, 30, 106, 110 (1954) June.

Some 600 wells in the San Juan Basin of northwest New Mexico have been drilled in using gas since May, 1951, when the first experiment was conducted. The results have been very good, reducing completion costs and drilling time, and resulting in a clean formation face. Data is presented. B. E. Eakin

Sneddon, R. THE FUNDAMENTALS OF HYDRAULIC FRACTURING. *Calif. Oil World*, 47, 2nd issue, 1, 2, 4, 5, 33 (1954) May.

The introduction of horizontal and vertical fractures in producing formations by the application of fluid pressure to the rock face has become a completion and workover procedure of major importance. The technique, equipment, and materials used in applying this technique in the field is outlined, and the results obtained are presented. B. E. Eakin

Flow Measurement

Amer. Gas Assoc. LARGE DIAMETER ORIFICE METER TUBE TESTS. Final Report Research Project NX-4 (1954) May.

The final report on tests conducted on 30-in. diameter orifice-meter runs. It is concluded that the equations for computing coefficients of discharge in AGA Gas Measurement Report No. 2 may be used within the tolerances given for large diameter meter tubes using either orifice flange unions or orifice fittings. The report includes information on the equipment, procedures and computational methods used as well as test results. R. F. Bukacek

Clark, G. B. A MULTITUBE DIFFERENTIAL PRESSURE MANOMETER FOR MEASURING THE AVERAGE FLOW OF FLUIDS IN CLOSED DUCTS. Univ. Illinois Bull. No. 410 (1953).

A report on the manometer developed at the University of Illinois using twenty fixed pitot tubes, which measures velocity pressures simultaneously at twenty points at a given cross section of duct, extracts the square root of each velocity pressure, averages the 20 square roots and multiplies the result by a constant which is adjusted for the specific weight of air in the duct at the time of test. The theory and construction of such a gage is described as well as the possible sources of error. R. F. Bukacek

Pugh, J. J. FRICTION FACTOR TESTS OF THE SUPER-INCH PIPELINE. *Gas*, 30, 97, 98, 100, 102, 105 (1954) June.

The efficient operation of large-diameter pipelines depends on minimizing the pressure loss due to friction of the gas flowing through the lines. The test procedures used on the Pacific Gas and Electric Company's 502 miles of 34-inch lines are presented. These include stabilization of flow, pressure measurements, and flowing temperature determinations. Due to the rough terrain transversed, all calculations must utilize an altitude correction factor.

B. E. Eakin

Spink, L. K. and Howe, W. H. FLOWMETER ENGINEERING. *Instr. and Automation*, 27, 783-7 (1954) May.

Different methods of flow measurement including fluid-head meters, electromagnetic, sonic and mass flow meters are discussed.

R. F. Bukacek

LP-Gas Storage

Billue, G. H. PRODUCTS GO UNDERGROUND. *Petroleum Ref.*, 33, 108-110;

Haight, J. N. and Bernard, F. G. WASHED OUT SALT BEDS. *Petroleum Ref.*, 33, 111-113;

Nixon, J. W. EXCAVATED CAVERNS. *Petroleum Ref.*, 33, 114-116 (1954) July.

A symposium on recent developments in underground storage, particularly for liquefied petroleum gases, is presented. With 9 million barrels of completed capacity and a total of 14 million now anticipated, this form of storage is gain wide acceptance due to extremely favorable economics. Cost of LP-gas underground facilities are estimated at one dollar per barrel for salt solution cavities to about five dollars for mined cavities, compared with 17 to 20 dollars per barrel of conventional steel surface propane storage. Descriptions of a recent solution cavity and mined cavity installation are given together with discussions of the problems associated with each. J. M. Reid

Swain, P. LPG STORAGE BOOMING. *Oil Gas J.*, 53, 66-68, 70 (1954) June 7.

Underground storage of LP-gas is becoming increasingly important as bigger sales are anticipated. At present about 100 underground storage facilities exist with 9,000,000 bbl capacity. Most underground pools are of salt layer or salt dome type. W. G. Bair

Pipeline Protection

Goodwin, C. L. LIGHTNING OR POWER FAULTS. *Gas Age*, 113, 39-40 (1954) June 3.

Experience with a gasket type of arrester is described, and the value of arresters is discussed. R. F. Bukacek

Miller, M. C. NEEDS, HAZARDS AND PROTECTION. *Gas Age*, 113, 34-47 (1954) June 3.

With the widespread use of insulating joints there has been little realization that they cause operating problems with physical, and explosion and fire hazards. This article cites experiences in this connection. R. F. Bukacek

Richard, C. S. USE OF LIGHTNING ARRESTERS. *Gas Age*, 113, 37-38 (1954) June 3.

Experience with lightning arresters for the protection of insulated joints in buried pipelines is related. The arresting device used is described. The factors which influence the frequency with which insulated joints are subject to excessive currents initiated by lightning are tabulated. R. F. Bukacek

Pipe Line River Crossings

Crawford, J. TWO LINES IN A SINGLE RIVER TRENCH. *Oil Gas J.*, 53, 92, 93, 98 (1954) June 7.

This article presents principle features of the submarine pipeline operation used in constructing the two 5,800 ft. products lines (8- and 12-inch diameter) which were laid simultaneously 3 ft. apart in the same trench (both lines coated with $\frac{5}{8}$ in. of somastic and $1\frac{3}{4}$ in. of Hevicote concrete) in the Delaware River between Philadelphia and New Jersey. S. Volchko

Graves, C. L. HOW THE BIGGEST MISSISSIPPI RIVER CROSSING WAS LAID. *World Oil*, 138, 285-289 (1954) June.

Complete operations involved in installing the two 24-inch and two 16-inch submarine crossings which were laid across the Mississippi River are described. A total of 4.6 million cubic yards was dredged from two ditches which accommodate two lines each. S. Volchko

Pipe Line Testing

Moon, L. B. HOW SINCLAIR PREPARES PIPELINE FOR PRODUCT SERVICE. *Oil Gas J.*, 53, 137, 138, 140 (1954) July 5.

With the know-how gained from placing more than 2,900 miles of pipeline in service for product service over the past 12 years the Sinclair Pipe Line Co. presents a program for inspection, testing, and maintaining products pipelines which provides for high efficiency in line operations. A five point program is used: 1) each joint of pipe is swabbed before welding; 2) each 5 to 15-mile length is tested with air-pressure after welding; 3) completed line is hydrostatically tested; 4) presurface cleaning consists of a series of scraper passes; 5) a consistent periodic in-service cleaning program is followed. S. Volchko

Purifier Experience

Feagan, R. A., Lawler, H. L. and Rahmes, M. H. EXPERIENCE WITH AMINE UNITS. *Petroleum Refiner*, 33, 167-8 (1954) June.

Improvements in design and operation which reduce corrosion, amine loss, and upsets in amine units are described. D. M. Mason

Underground Storage

Goodman, J. V. THE UNDERGROUND STORAGE OF GAS IN THE UNITED STATES, Third Ann. Rept. Comm. on Underground Storage, Amer. Gas Assoc. (1954) March 3: UNDERGROUND STORAGE IS 1.7 TRILLION. *Gas Age*, 113, 39-41 (1954) April 22.

A presentation of statistics showing the growth in the use of underground storage. The tentative definitions of terms of the committee on underground storage are included.

R. F. Bukacek

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Conversion Process

Dutcher, H. (assigned to Phillips Petroleum Co.) PEBBLE HEATER AND METHOD OF CONVERTING HYDROCARBONS. U. S. 2,682,497 (1954) June 29.

This invention comprises a method and means for converting heavy petroleum oils to lower boiling hydrocarbon materials such as propylene, ethylene, and high aromatic gasoline-type materials. This improved operation is obtained by an improved pebble heater apparatus which utilises the conventional 2-chamber device but which has, in addition, at least one other pebble chamber. This is utilized for coating the pebbles at a relatively low temperature with the heavy petroleum oil charge-stock for the system. The method of converting the heavy petroleum oil fraction to the lower boiling hydrocarbon materials has the features of better distribution of the oil throughout the reaction chamber and a less direct contact between the oil-charge stock and the hot pebbles from the pebble heater chamber. S. Volchko

Oil Well Spacing

Miller, F. G. MULTIPHASE-FLOW THEORY AND THE PROBLEM OF SPACING OIL WELLS. U. S. Bur. Mines Bull. 529 (1954) May.

The analytical developments in this report begin with a detailed examination of Darcy's law and mechanical-energy relationship as applied to steady, isothermal, single-phase flow. The equations are generalized to include heat transfer between the fluids and the porous media and the concept of relative permeability. The resulting equations are derived for three-dimensional, unsteady multiphase flow, and are the general form of the equation. Certain simplifying assumptions are made to transform the equation to describe a transient but strictly radial-flow system. The final form is considered to be the simplest form in which the equations are applicable to the well-spacing problem. If these three-phase (gas, oil, and water) transient, radial-flow equations could be integrated, with proper boundary conditions, then an analytical solution to one of the simplest forms of the well-spacing problem would be available. The analysis is concluded with a discussion of the assumptions that are made in developing the multiphase-flow equations, with a discussion of practical considerations in the treatment of well-spacing and with proposed future research on the well-spacing problem. B. E. Eakin

Refining Capacity

Brown, B. K. WAS THE INDUSTRY PUSHED INTO OVERBUILDING REFINERIES OR DID IT FALL? *Nat. Petroleum News*, 46, 16-20 (1954) July 21: *Petroleum Proc.* 9, 1360-63 (1954) September.

Oil industry leaders, increasingly disturbed by the mounting oil stocks and the need for slashing refinery throughout, are asking: Who is responsible for the apparent surplus of refining capacity—government or industry? One leader who has examined the situation carefully is Bruce K. Brown, president of Pan-Am Southern Corp. Mr. Brown believes there is no pat answer but thinks that overbuilding was caused by some of both. For the full answer, a reading of Mr. Brown's statement is recommended.

Author's Abstract

Shale Oil

Cameron, R. J. and Guthrie, B. OIL FROM SHALE. *Chem. Eng. Progress*, 50, 336-341 (1954) July.

This article by Bureau of Mines engineers

traces the development work leading to the construction of an oil shale retorting process adapted to the type of shale and the economic conditions prevailing in the United States. A successful process must have high capacity and efficient energy utilization, and due to the area where the oil shale is found, little or no water can be consumed by the process. Despite these problems, a desire to utilize the estimated 80 billion barrels of recoverable crude shale oil has stimulated activity by both government and industry. Initial investigations led to the eventual development of the Bureau of Mines Gas-Combustion Process to a 150/day pilot plant which is discussed in detail. E. B. Shultz

Synthesis Catalysts

Black, J. F. and Kearby, K. K. (assigned to Standard Oil Development Co.) HYDROCARBON SYNTHESIS PROCESS. U. S. 2,682,552 (1954) June 29.

The patent claims that fusion and sintering of iron catalysts during reduction and normal usage is greatly reduced by the addition of metal oxides of high sintering temperature. These metal oxides act as binders for the iron and prevent particle agglomeration due to sintering of the iron or iron oxide surfaces. Natural occurring iron compounds of the above type are high-iron bauxite, green sand, iron silicate and other similar ores. H. A. Dirksen

McGrath, H. G. and Rubin, L. C. (assigned to The M. W. Kellogg Co.) HYDROCARBON SYNTHESIS WITH REDUCED MAGNETITE CATALYST. U. S. 2,683,726 (1954) July 13.

According to this invention, a highly satisfactory and improved catalyst for the hydrogenation of an oxide of carbon to produce organic compounds is manufactured from a naturally occurring iron compound, such as magnetite. According to an embodiment of this invention, naturally occurring magnetite is fused under conditions such that a molten mass is formed and thereafter the molten mass is cooled sufficiently to solidify the same. The solidified fused mass is reduced to produce a very active and selective catalyst containing iron as the major component. Authors' Abstract

7. ANALYTICAL METHODS AND TESTS

Crude Fractions Analysis

Carruthers, W. and Cook, J. W. THE CONSTITUENTS OF HIGH-BOILING PETROLEUM DISTILLATES. PART I. PRELIMINARY STUDIES. *J. Chem. Soc.* (British), 2047-2052 (1954) June.

As a preliminary to the examination of high-boiling crude fractions for carcinogenic properties, the aromatic extract from an American crude oil was examined. Perylene, an alkylchrysene, and two oxygen-containing compounds have been isolated from an extract of an American crude oil distillate. Several chrysene homologues with large alkyl substituents have been synthesized for comparison with the aforesaid alkylchrysene. D. M. Mason

Fischer Method

Sneed, R. W., Altman, R. W. and Mosteller, J. C. EFFECT OF AVIATION FUEL COMPONENTS ON THE ACCURACY OF THE KARL FISCHER ELECTROMETRIC TITRATION. *Anal. Chem.*, **26**, 1018-1020 (1954) June.

Of the compounds investigated, including tetraethyllead, aromatics, olefins, mercaptans and oxidation inhibitors, only mercaptans appear to show any interference. R. F. Bukacek

Nitrogen Determination

Edwards, A. H. THE SEMI-MICRO KJELDAHL METHOD FOR THE DETERMINATION OF NITROGEN IN COAL. *J. Appl. Chem.* (British), **4**, 330-340 (1954) June.

The type and amount of catalyst and conditions of heating for the semi-micro Kjeldahl method for nitrogen have been investigated. Blank corrections have been considerably reduced by using a modified Markham distillation apparatus. Limits within which duplicate results should agree and limits of error of the determination are given. D. J. Dennison

Oxygen Determination

Wright, M. M. DETERMINATION OF LOW CONCENTRATIONS OF OXYGEN IN HYDROGEN. *Anal. Chem.*, **26**, 1001-1008 (1954) June.

Oxygen in hydrogen can be determined by the formation of water vapor on a platinum cata-

lyst followed by separation by condensation at the liquid nitrogen temperature, and measurement of the volume at 10-mm. pressure. The method is standardized to take into account the adsorption of water vapor on the glass apparatus. The lower limit in the apparatus is 0.00005% oxygen on a 1.3-liter sample with an error of ±10%. The error decreases as the concentration increases, becoming ±2% above 0.002% oxygen. Author's Abstract

Reliability of Tests

McArthur, D. S., Baldeschwieler, E. L., White, W. H. and Anderson, J. S. EVALUATION OF TEST PROCEDURES. *Anal. Chem.*, **26**, 1012-1018 (1954) June.

To obtain an estimate of reliability of a test method from an exchange of samples between laboratories, the data are first combed for wild results. Then a preliminary review is made to determine whether or not the reliability of the test depends on the magnitude; if not, all the data are pooled to obtain a single estimate of reliability for the whole range of magnitudes studied. The four statistical tools used are: analysis of variance, the F test for comparing variances, Dixon's Q test for rejecting "off" laboratories, and Bartlett's test for homogeneity of variances. The statistical evaluation is only approximate. It gives a working estimate of the reliability of the test method, and it indicates which laboratories, if any, are not qualified to run the test without improvements in their technique. The statistical evaluation outlined has proved useful in laboratories of the Standard Oil Co. (N.J.) Authors' Abstract

Sampling Gas-Condensate

Reudelhuber, F. A. SEPARATOR SAMPLING OF GAS-CONDENSATE RESERVOIRS. *Oil Gas J.*, 53, 138-140 (1954) June 21.

The study of gas-condensate systems requires obtaining accurate samples of the separator fluids as well as separator temperature, pressure, and gas-oil-ratio. The well must be properly prepared for sampling, in order to assure a flow of fluid into the well bore which properly represents the reservoir fluid, and the separator flow rate must be sufficient to prevent separation of the two-phase stream in the production tubing. The techniques required to properly sample gas-condensate reservoirs are presented in some detail, with emphasis on gas and liquid production measurements, and sampling procedures. B. E. Eakin

Sulfur by Titration

Landsberg, H. and Escher, E. E. POTENTIOMETRIC INSTRUMENT FOR SULFUR DETERMINATION. *Ind. Eng. Chem.*, **46**, 1422-1428 (1954) July.

An automatic instrument, commercially known as the Titrilog, continuously records trace quantities of oxidizable sulfur compounds in the range of 0.1 to several hundred p.p.m. by volume in gases. An electronically controlled coulometric titration with electrolytically generated Br_2 is used. Various applications are discussed. D. J. Dennison

The following articles, the abstracts for which appear on the pages indicated, are also called to your attention:

Bass, A. M. SPECTROPHOTOMETRIC ATLAS ON TRANSITION OF OH. p. 164

BAUER, R. L. DISTILLATION CONTROL. p. 166

8. GENERAL AND PHYSICAL CHEMISTRY

Adsorption

Millard, B., Beebe, R. A. and Cynarski, J. THE HEAT OF ADSORPTION OF METHANOL ON CARBON ADSORBENTS AT 0°. *J. Phys. Chem.*, 58, 468-471 (1954) June.

Heats of adsorption have been measured in an isothermal calorimeter at 0° for methanol on several carbon adsorbents previously studied. The results are compared and contrasted with those obtained in similar previous experiments on the same adsorbents but with the elementary gases, argon and nitrogen, as adsorbates. The calorimetric heats on the homogeneous surface of Graphon carbon, like the isosteric heats of Pierce and Smith for methanol-graphite, give no indication that the net heat of adsorption is negative in the region of low coverage where the isotherms are convex to the pressure axis. Authors' Abstract

CO_2 Properties

Wooley, H. W. THERMODYNAMIC FUNCTIONS FOR CARBON DIOXIDE IN THE

IDEAL GAS STATE. *J. Res. Nat. Bur. Standards*, 52, 289-292 (1954) June.

The thermodynamic functions $C_p°/R$, as well as $(H° - E_o°)/RT$, $-(F° - E_o°/RT$, and $S°/R$ for CO_2 in the ideal state are given from 50 to 5000° K, based on the latest spectroscopic data. Author's Abstract

Hydrocarbon Separation

Gorin, E. SEPARATION OF HYDROCARBONS AND HYDROCARBON DERIVATIVES. U. S. 2,681,302; Anderson, H. C. and Delaney, C. J. SEPARATION OF HYDROCARBONS AND HYDROCARBON DERIVATIVES BY ADDUCT FORMATION. U. S. 2,681,303; Gorin, E. SEPARATION OF SULFUR-CONTAINING COMPOUNDS BY UREA ADDUCT FORMATION. U. S. 2,681,336 (assigned to Socony-Vacuum Oil Co.) (1954) June 15.

This group of inventions utilizes the differing ability of hydrocarbons and their derivatives to enter into and to be removed from crystalline complexes, or "adducts", with such compounds as urea and thiourea. U.S. 2,681,303 outlines the principles and some general applications. U. S. 2,681,302 describes a continuous process for hydrocarbon separation by complex formation. A saturated urea solution enters the top of a tower and flows down until it meets a colder stream of hydrocarbon mixture introduced in the tower middle. Upon contact, a suspension of rigid urea globules is formed and the mixtures flow co-currently while complex formation occurs. At the bottom, the complex is thermally decomposed, and the urea is recycled. U. S. 2,681,336 claims the recovery of straight chain aliphatic compounds with a sulfur-containing terminal substituent. Rules for the permissible chain length, and the substituent "width" are given in detail in twelve claims. (Note similar patents 2,681,332 to 335; 2,681,337). E. B. Shultz

Hydrocarbon Properties

Opfell, J. B., Schlinger, W. G. and Sage, B. H. BENEDICT EQUATION OF STATE APPLICATION TO METHANE, ETHANE, n-BUTANE, AND n-PENTANE. *Ind. Eng. Chem.*, 46, 1286-1291 (1954) June.

The equation of state developed by Benedict, Webb and Rubin is a satisfactory relation to describe the volumetric behavior of the lighter hydrocarbons. The equation is also of interest in describing behavior in the liquid phase. The coefficients as originally evaluated were for pressures below 5000 psi. Recent interest in higher pressure has made it desireable to extent the range to 7000 psi, which the authors have done for these components. The average standard error of estimates for the compressibility factor from the molal volume and temperature is from 0.0138 for ethane, to 0.0258 for n-pentane. A least squares calculation procedure was used with the computations being made on an electronic digital computer. B. E. Eakin

OH Spectra

Bass, A. M. and Broida, H. P. A SPECTROPHOTOMETRIC ATLAS ON THE $^2\Sigma^+ - ^2\Pi$ TRANSITION OF OH. Nat. Bur. Standards Circ. 541 (1953) June 26.

Charts (20) are given of intensity vs. wave length (2610 — 3520 A°) of the $^2\Sigma^+ - ^2\Pi$ transition of OH, taken on an experimental high-resolution grating monochromator. The identification is from Dieke and Crosswhite's work on OH and is extended where possible. The O_2 Schuman-Runge band $^3\Sigma_u^- - ^3\Sigma_g^+$ in the 3370-3430 A° region is from the paper of Lochte-Holtgreven and Dieke. R. R. Amrine

Viscosity

Andrade, E. N. THE VISCOSITY OF LIQUIDS. *Endeavour* (British), 13, 117-27 (1954) July.

A general discussion is presented dealing mainly with Newtonian fluids. Temperature and pressure effects, a brief theoretical review, polar liquids, and the effect of chemical constitution are discussed. W. W. Clauson

X-Ray Diffraction

Swanson, H. E., Fuyat, R. K., and Ugrinic, G. M. STANDARD X-RAY DIFFRACTION POWDER PATTERNS. DATA FOR 34 INORGANIC SUBSTANCES. Nat. Bur. Standards Circ. 539, 3, (1954) June 10.

Data for thirty-two standard X-ray diffraction powder patterns are presented in revision of the eighty-one corresponding patterns in the American Society for Testing Materials card

file, a system for the identification of unknown crystalline materials based on the three strongest reflections of each structurally distinct phase. Patterns for two compounds not represented in the file are also included. A comparison is made between all powder data available for each of the substances reported. The patterns were made with a geiger counter X-ray spectrometer, using samples of exceptionally high purity. The d-spacings were assigned Miller indices determined from calculated patterns of theoretical spacings and from space group considerations. The lattice constants and densitites were calculated, and the refractive indices were measured whenever possible.

Authors' Abstract

Wallwork, S. C. and Harding, T. T. A SIMPLE METHOD OF OBTAINING LOW-TEMPERATURE X-RAY DIFFRACTION PHOTOGRAPHS. *J. Sci. Instruments*, (British) **31**, 163-165 (1954) May.

A low-temperature X-ray diffraction photo camera, consisting of a Dewar flask filled with liquid nitrogen, a rubber tubing that is lagged with insulation, and a heating system used to vaporize the liquid nitrogen is described. Temperatures between —30° to —60° may be obtained by this process. S. Mori

9. ORGANIC CHEMISTRY

Acetylene Processes

Berg, C. H. (assigned to Union Oil Co.) PROCESS AND APPARATUS FOR ACETYLENE PRODUCTION. U. S. 2,679,540 (1954) May 25; APPARTUS AND PROCESS FOR ACETYLENE PRODUCTION. U. S. 2,679,541 (1954) May 25.

Dorsey, W. S. PROCESS FOR THE PRODUCTION OF ACETYLENE. U.S. 2,679,542 (1954) May 25; PRODUCTION OF ACETYLENE. U. S. 2,679,543 (1954) May 25.

Bills, J. L. MANUFACTURE OF ACETYLENE AND MIXTURES OF ACETYLENE AND HYDROGEN CYANIDE. U. S. 2,679,544 (1954) May 25.

A process and apparatus is described for the production of acetylene by the partial combustion of hydrocarbons. The process utilizes air rather than pure oxygen for the partial combustion step, and yields equal to or greater than those obtained with oxygen are claimed by recycle of a high-hydrogen content gas through the reaction zone. Separation of the acetylene is accomplished with a solid absorbent system. Several modifications of the processs and equipment are explained in this series of patents.

J. M. Reid

Cyanide-Acetylene Process

Perry, C. W. (assigned to Phillips Petroleum Co.) PROCESS FOR PRODUCTION OF HYDROGEN CYANIDE AND ACETYLENE. U. S. 2,682,447 (1954) June 29.

Improvements in the production of acetylene and hydrogen cyanide by the electric arc method are claimed. By passing the hydrocarbon feed stream through a moving bed (pebble heater) thermal cracking unit before entering the arc reactor, precracking of the heavier components is effected reducing the carbon deposition normally occurring in the arc process. Associated increases in acetylene and HCN yields are also claimed. J. M. Reid

Ethylene Production

Cornell, P. W., Litchfield, W. H. and Vaughan, H. M. PRODUCING AND DISTRIBUTING ETHYLENE. *Petroleum Refiner*, **33**, 135-140 (1954) July.

A general discussion of the problems associated with the thermal cracking process for ethylene production. W. G. Bair

Mitchell, H. A. WHAT IS THE DEMAND FOR ETHYLENE? *Oil Gas J.*, **53**, 95-97 (1954) June 28.

Consumption of ethylene, essentially for production of petrochemicals, is estimated to be near 3 billion pounds by 1956. The increasing production of petrochemicals is bound to have a direct effect upon the LPG market.

J. M. Reid

Petrochemicals

Seaman, J. SYNTHETIC FATS, SOAPS AND ALLIED PRODUCTS. I. DEVELOPMENT AND POTENTIAL. *Chem. Process Eng.* (British), **35**, 165-168 (1954) June.

A discussion of the technical and economic background involved in producing commodities currently based on glyceride oils and fats from the large quantities of by-products of petroleum refining. D. J. Dennison

10. CHEMICAL ENGINEERING

Cleaning by Solvents

Barbarin, M. P. HOW OPERATING EQUIPMENT IS CLEANED WITHOUT DISMANTLING. *Am. Gas J.*, 180, 16, 17, 38 (1954) June.

The use of chemical solvents to clean operating equipment in place has advantages. The type of solvents, equipment, and application of the solvents are discussed. W. G. Bair

Distillation Control

Bauer, R. L. and Orr, C. P. DISTILLATION CONTROL PROBLEMS APPLICATION OF THE McCABE-THIELE DIAGRAM. *Chem. Eng. Progress*, 50, 312-318 (1954) June.

How McCabe-Thiele diagrams may be used to determine the degree of control attainable with given distillation control systems is shown in this paper, and the basic theory and principles of the diagrams are reviewed. Four basic control schemes are studied to determine their ability to control a binary distillation as feed composition changes. The method is also applicable in determining the effect of a change in some other variable. This method of analysis is used to determine the controllability of a column operating with a high reflux ratio. The effect of changing feed composition is studied for two selected control schemes. Authors' Abstract

Heat Transfer

Cairns, R. C. and Roper, G. H. HEAT AND MASS TRANSFER AT HIGH HUMIDITIES IN A WETTED WALL COLUMN. *Chem. Eng. Science* (British), 3, 97-109 (1954) June.

The liquid rate in an adiabatic wetted-wall column is found to have an appreciable effect on the mass and heat transfer coefficients in the column. Experimental results indicate that, at high humidities for air-water systems, the gas film coefficients of mass transfer vary as the 0.17 power of the ratio p_{BM}/P and those of heat transfer, as the 0.27 power of this ratio. This is in contrast to the conclusions, arrived at by previous authors on the basis of the film theory, that the gas film coefficients of mass transfer vary as the 1.00 power of p_{BM}/P and those of heat transfer are independent of this ratio. Here P_{BM} is the log mean partial pressure of the non-diffusing gas in the gas film and P the total pressure in the system. S. Hu

Marris, A. W. THE MOMENTUM AND VORTICITY TRANSFER THEORIES OF TURBULENT HEAT TRANSFER. *Can. J. Phys.*, 32, 419-429 (1954) June.

Mathematical analysis of heat transfer by a cylindrical turbulent core has been made on the basis of the vorticity transfer analogy and results are compared with those obtained on the basis of the momentum transfer analogy. Theoretical calculations for a special case were carried out from equations developed in this paper and von Karman's friction factor law. Lower heat transfer coefficients by the vorticity theory were attributed to the greater distance of penetration into the turbulent region for the eddy diffusivity for vorticity to reach high values in comparison to the corresponding distance of penetration for the eddy diffusivity for momentum transfer. S. Hu

Mixing

Quillen, C. S. MIXING LIQUIDS, PASTES, PLASTICS, SOLIDS, BY CONTINUOUS MIXING. *Chem. Eng.*, 61, 178-224 (1954) June.

This is a very comprehensive report on all phases of the mixing process as a unit operation. Discussion is based on the following six sub-headings: 1) Introduction; 2) Liquid Mixing. 3) Plastics Mixing. 5) Solids Mixing and 6) Continuous Mixing. Modern industrial practices and commercial equipment are described thoroughly and illustrated with diagrams and photographs. S. Hu

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Diffraction Computer

McMillan, W. R. MECHANICAL ANALOG COMPUTER FOR READING ELECTRON DIFFRACTION PATTERNS. *Rev. Sci. Instruments*, 25, 545-547 (1954) June.

An instrument, using simple mechanical linkages, has been constructed for solving an equation of the form: $d = k/r$, which appears in determining the radius of each diffraction ring

and computing the crystal lattice spacing responsible for each reflection, in electron diffraction patterns. The spacings are printed, together with estimated line intensities, on adding machine paper. The instrument decreases the possibility of accidental errors in reading, and reduces the time involved by one-half.

B. E. Eakin

Leak Detection

Hartz, N. W. A NEW APPROACH TO GAS LEAK DETECTION. *Gas*, **30**, 38-40 (1954) July.

A recently developed full-scale combustible gas indicator employs an electrical range multiplying system utilizing both the combustion and thermal conductivity methods without dilution technique. D. J. Dennison

Liquid-Level Gage

Hamontre, H. C., Taliaferro, D. V., McClung, C. F. and Mueller, F. G. BUREAU OF MINES LIQUID-LEVEL GAGE. U. S. Bur. Mines Rept. Invest. 5060 (1954) June.

The liquid-level gage described in this report is an instrument designed to locate liquid levels in wells rapidly and accurately and with auxiliary equipment described, to follow moving gas-liquid interfaces automatically. The instrument is sensitive to changes in liquid level of ½-inch, but is limited in accuracy to the accuracy of the wire-line depth indicator used. It is not affected by pressure or temperature, and it can be run in open hole or under pressure through a lubricator. B. E. Eakin

Nuclear Power Equipment

Amorosi, A. PIPING, PUMPS AND VALVES FOR HIGH PRESSURE WATER REACTOR SYSTEMS. *Heating Piping and Air Conditioning*, **26**, 140-144 (1954) May.

The author presents an excellent discussion of the radioactivity problems of high-pressure, water-cooled nuclear plants and their effects on selection of materials and design of components. A comparison of a coal-fired steam plant and a reactor system is included. S. Volchko

Pebble Heater

Vance, F. P. (assigned to Phillips Petroleum Co.) GAS REACTION CHAMBER. U. S. 2,680,676 (1954) June 8.

A pebble heater apparatus is described for the production of synthesis gas with provision for separately preheating the reactants in the lower section. E. J. Pyrcioch

Refinery Control

Eltenton, G. C. SOME INSTRUMENTS FOR QUALITY CONTROL IN PETROLEUM REFINERIES. *J. Appl. Chem.*, **4**, 245-256 (1954) May.

Brief descriptions are given of an automatic distillation apparatus for performing Engler distillations, a recording viscometer for oils and grease, a flash-point recorder, a recording colorimeter, a detector for water in acetone, and a tester for indicating inhomogeneity in blending vessels. The use of such instruments in petroleum refineries illustrates the growing need for faster and more accurate measurement of product quality. Author's Abstract

Steam Accumulators

Goldstern, W. SOME IMPORTANT APPLICATIONS OF HEAT STORAGE IN INDUSTRY. *Fuel Economist* (British) **2**, 197-202 (1954) June.

The use of accumulators for the storage of steam is illustrated for some industrial applications. Their use is advocated for meeting steam peak demand, balancing boiler load, hot-water storage and storage of exhaust low-pressure steam from turbines. The operation of a boiler accumulator which can be used as a steam accumulator and is also immediately available as a reserve boiler is described. E. J. Pyrcioch

Tar Dehydrator

Cellan-Jones, G. DEHYDRATION OF TAR. *Coke and Gas* (British), **16**, 247-48 (1954) June.

Tar enters the top chamber of a vertical tubular "condenser" and overflows in a thin film down the tubes, which are heated on their outer surface by a steam chamber. Coke oven gas is passed counter-current to the tar flow to sweep out the moisture (and light oils) and return these to the exhauster suction, and the dehydrated tar drops from the tubes to a lower chamber from which it is pumped to loading tanks. Steam consumption data and diagrams have been provided by the Didier-Kogag-Hinselman Co. O. P. Brysch

12. MATERIALS OF CONSTRUCTION

Cathodic Protection

Rosselle, D. T. MINIMIZING DAMAGE TO ADJACENT STRUCTURES IN URBAN CATHODIC PROTECTION INSTALLATIONS. *Corrosion*, **10**, 192-194 (1954) June.

Methods of minimizing damage to structures adjacent to underground cathodic protected installations are discussed. The author emphasizes the advantages of cooperative protection of all underground structures in an area.

A. J. Tulis

Shreir, L. L. CATHODIC PROTECTION-2. *Corrosion Techn.*, (British) **1**, 103-106 (1954) June.

The article describes various techniques for obtaining cathodic protection for pipes, tanks, and various chemical processing equipment. This is a practical follow-up on the theoretical principles of corrosion which were presented in the first article.

B. E. Eakin

Coatings

Resen, F. L. STREAMLINED INTERNAL CLEANING-COATING OPERATION. *Oil Gas J.*, **53**, 112-113 (1954) June 28.

A new internal pipe coating machine has been developed to insure that stored pipe will be protected against undue corrosion.

W. G. Bair

Scott, J. THE NEW LOOK IN PIPE LINE COATING EQUIPMENT. *Petroleum Eng.*, **26**, D16-D18 (1954) July.

A description of a pipe coating plant located at the pipe yards. The pipe is pre-coated here to order before being sent to the construction site, with considerable savings of time and transportation.

W. G. Bair

Sharpe, L. G. HOW GOOD MUST PIPELINE COATING BE? *Oil Gas J.*, **53**, 130-132 (1954) June 14.

A summary of pertinent information on a number of pipelines for comparing coating practices and costs with cathodic protection requirements and costs is presented. Even the best installed coatings are not free from imperfection and require cathodic protection to fully protect the pipe.

S. Volchko

Corrosion

Moore, J. P. MAINTAINING THE CORROSION RESISTANCE OF WELDED STAINLESS STEEL. *Corrosion Techn.* (British), **1**, 92-96 (1954) June.

The essence of a successful weld is that the joint should possess similar properties to the parent material. In the welding of stainless materials it is essential that the corrosion resistance be preserved in the weld metal and adjacent areas. In this article the author discusses the difficulties involved and the means whereby corrosion resistance is maintained.

Author's Abstract

Paredes, F. and Cronenberg, J. W. COMBATING HEAT-EXCHANGER CORROSION . . . IN GLYCOL-AMINE GAS-TREATING PLANTS. *Oil Gas J.*, **53**, 159-161 (1954) June 21.

Early tests and observations showed that aluminum, chromium-molybdenum, and stainless-steel alloys as well as Monel and Inconel were suitable heat-exchanger materials. For economic reasons aluminum alloys and Croloy 5 have been used. El Paso has increased heat-exchanger life from a minimum of 3¾ months to an estimated life of 2 years by the use of aluminum, yet many problems remain unsolved. Preliminary tests with 61S-T6 aluminum and anodized aluminum tubes are encouraging.

Authors' Abstract

Insulating Concrete

VERMICULITE CONCRETE—A NEW AND PRACTICAL FIREPROOFING. *Butane-Propane News*, **16**, 38-42 (1954) July.

A mixture of one part Portland cement and 12 parts No. O vermiculite were applied in a 2½-inch layer by cement gun to a butane storage tank with excellent results. Tests on a small tank showed sufficient insulating properties for the covering to be passed by the insurance inspector.

W. G. Bair

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